2296 - 1873

[*From the* PHARMACEUTICAL JOURNAL *for* NOVEMBER *and* DECEMBER, 1850, *with some Corrections.*]

ON THE MYROSPERMUM OF SONSONATE,

FROM WHICH THE SO-CALLED BALSAM OF PERU, WHITE BALSAM, AND BALSAMITO, ARE OBTAINED.

BY JONATHAN PEREIRA, M.D., F.R.S.

THERE is no article of the Materia Medica whose natural history is more obscure than that of the so-called Balsam of Peru; for in all our best modern pharmacological and botanical works, errors, confusion and doubts exist with respect to it.

Of the celebrated white balsam of America, I am not sure that European writers have any definite knowledge. It is mentioned, indeed, by most pharmacologists, but it is obvious from their statements that they are unacquainted with it; for some of them regard it as liquidamber, some as balsam of Tolu, and others as dry balsam of Peru; from all of which, as will be seen in the sequel, the white balsam of Sonsonate essentially differs. It is, therefore, with much pleasure that I avail myself of the information and specimens kindly placed at my disposal by George Ure Skinner, Esq., now of Chipperfield House, King's Langley, Hertfordshire, but lately of Guatemala, to elucidate these subjects. To my friend Dr. Stenhouse I am also indebted for kindly undertaking the chemical examination of the white balsam, the result of which has been the discovery of a new organic principle, to which he has given the name of *Myroxocarpine*.

In order that my readers may fully comprehend the present state of our knowledge with respect to these drugs, and the sources of the errors and obscurities which have hitherto existed about them, I shall take a brief historical survey of the most important works and papers relating to them.

1. Nicolas Monardes, in whose work* (the first edition of which was published at Seville in 1565) the earliest mention of American balsam occurs, calls it simply *balsamo*, and says that it is the produce of a tree growing in New Spain, and called by the Indians *Xilo*. He describes the tree as being larger than a pomegranate tree, having leaves like those of nettles, and bearing a narrow, white, thin siliqua or pod, of the length of a finger, and thickness of a sixpence, and which encloses at the end one bitter, odorous seed, about the size of a pea. He mentions two modes of preparing the balsam: one by incision into the

* *Dos libros, el uno que trata de todas las cosas que traen de nuestras Indias Occidentales, y el otro que trata de la piedra bezoar y de la yerba escorzonera.* Seville, 1565, 8vo (I have not seen this edition, which I quote on the authority of Don A. H. Morejon, author of the *Historia Bibliográfica de la Medicine Española*, tomo ii., p. 291, 1843. The editions which I possess are Clusius's Latin translation, *Exot.* lib. x., 1605; and Frampton's English version, entitled *Joyfull Newes out of the New-found Worlde*, 1596; and from these the extracts in the text are taken).

rind of the stem, the other by boiling the branches in water; and he afterwards notices its physical properties and valuable medicinal qualities.

Although Monardes was never in America, and must, therefore, have obtained his information from the reports of others, yet there is reason to believe his statements to be faithful.

2. The next writer who describes the balsam and the tree yielding it, is Francisco Hernandez,† a Spanish physician and naturalist, who resided for seven years (viz., from 1593 to 1600, A.D.) in Mexico and New Spain. He notices four balsam trees, one called *Hoitziloxitl*, a second termed *Huaconex*, a third denominated *Maripenda*, and the fourth found in the province of Tolu. Of these four, the first one appears to me to be identical with the tree which yields the so-called balsam of Peru, and I, therefore, subjoin a copy of Hernandez's figure of it (fig. 1).

Fig. 1.

Hoitziloxitl.
(Copied from Hernandez).

Hernandez states that the Indian balsam tree (*Arbor Balsami Indici*) is called by the Mexicans *Hoitziloxitl*, because it abounds in resin. He describes it as being of the size of lemon tree, and having leaves which are larger than those of the almond, but rounder, and more acuminate. The flowers are yellow, and are placed on the summits of the branches. The seeds are whitish, oblong, somewhat contorted, and lodged at the extremity of the oblong shells or fruits, which are longer and broader than the leaves. The tree, he says, is

† *Plant. Animal. Mineral. Mexicanorum Historia.* Ex Fr. Hernandez, a N. A. Recchio. Romæ, 1651. fol.

a native of warm regions, as Panuco, and was cultivated by the Mexican kings in the Hoaxtepec gardens. He describes two methods of obtaining the balsam, and states that the seeds yield by pressure an oil which resembles in flavour and odour that obtained from bitter almonds and peach kernels.

3. After the death of Linnæus (who had always been peculiarly anxious to ascertain the plant which yields this balsam), Mutis sent to the younger Linnæus specimens of the leaves and flowers of a plant, which he said grew in the warmest provinces of South America, and yielded Peruvian balsam. A description of this plant, to which the name of *Myroxylon peruiferum* was given, was published in the *Supplementum Plantarum*, p. 233, 1781. Subjoined is a figure (fig. 2) of the incomplete leaf of Mutis's specimen, contained in the collection of the Linnæan Society, and of which a detailed description has been published by Sir J. E. Smith, in Rees's *Cyclopædia*, vol. xxiv, article *Myroxylon peruiferum*‡.

Fig. 2.

Leaflets of *Myroxylon peruiferum*. Linn. (From Mutis's specimen in the Collection of the Linnean Society. The wood-cut is about one-third the natural size of the leaf).

Considerable difference of opinion has existed among botanists as to the identity of this species. Lamarck§ regarded it as identical with Jacquin's‖ *Myrospermum frutescens* (fig. 3), and distinct from his own *M. pedicellatum* (fig. 4); Sir J. E. Smith considered it to be different from both of these species; while Kunth¶, whose view has been adopted by De Candolle**, declared it to be distinct from *M. frutescens*, but identical with Lamarck's *M. pedicellatum*.

In Mutis's specimen in the Linnean collection, the leaflets are acuminated, whereas in Lamarck's figure they are represented as being obtuse, though in his description he says they are sometimes a little pointed. Kunth, who examined and described another specimen of this species, given by Mutis to Bonpland, declared it to be identical with the plant described and figured by Lamarck as *M. pedicellatum;* and De Candolle, in his *Prodromus*, has adopted the opinion of Kunth.

Fig. 3.

Leaflets of *Myrospermum frutescens*. Jacq. (From Kunth's figure. The wood-cut is about one-third the size of the original figure).

On the authority of Mutis many writers declare the *M. peruiferum* of Linnæus to be the source of balsam of Peru.

4. The plant which Lamarck described and

‡ Mutis's specimen in the Linnean Society consists of the imperfect leaf above figured, and of a flowering branch. Attached to the same sheet of paper is a long pod, which has been erroneously described by Sir J. E. Smith, as the fruit of *M. peruiferum*. In the *Suppl. Plant.*, no mention is made of fruit sent by Mutis; and the pod which has been, by some remarkable mistake, glued to the paper, is certainly not the fruit of a *Myrospermum* or *Myroxylon*.

§ *Encyclop. Méthodique Botanique*, t. iv., p. 191, 1795-6.

‖ *Select. Stirp. American. Hist.*, p. 152, 1788.

¶ Humboldt, Bonpland, and Kunth, *Nova Genera et Spec. Plant.*, t. vi., p. 294, fol. 1823.

** *Prodromus*, part ii., p. 95, 1825.

figured under the name of *Myrospermum pedicellatum* (fig. 4) was collected by Joseph de Jussieu, in Peru, where it is said to be called *quina-quina*. No mention is made by Lamarek of any resin or balsam being obtained from it.

Fig. 4.

Fruit, flowers, and leaflets of *Myrospermum pedicellatum*. Lamarek. (From Lamarek's figure in the *Encyclop. Méthodique*. The woodcut is about one third the size of Lamarek's figure.)

5. In 1792 Ruiz published, in his *Quinologia*, a botanical description of the tree which, he states, yields balsam of Peru. He says the tree is known in Peru under the name of *Quinoquino*, and he calls it *Myroxylon peruiferum*, considering it to be identical with the *M. peruiferum* sent by Mutis to the younger Linnæus. He adds that the tree grows in the mountains of Panatahuas, in the forests of Puzuzu, Muña, Cuchero, Paxaten, Pampahermosa, and in many other countries near the river Maranon, in low, warm, and sunny situations; but the Indians of these places do not collect the balsam. Furthermore he says, "the balsam of Quinquino is procured by incision at the beginning of spring, when the showers are gentle, frequent, and short: it is collected in bottles, where it keeps liquid for some years, in which state it is called *white liquid balsam*. But when the Indians deposit this liquid in mats or calabashes, which is commonly done in Carthagena, and in the mountains of Tolu, after some time it condenses and hardens into resin, and is then denominated *dry white balsam*, or *balsam of Tolu*, by which name it is known in the Druggists' shops."

6. In 1821 Mr. Lambert published, in his *Illustration of the Genus Cinchona*, a translation of Ruiz's Memoir. To this he added a plate taken from very fine specimens received from his friend Pavon. As I shall presently endeavour to show the plant figured by Lambert is not the one described by Ruiz. Kunth and De Candolle declare it to be their *Myrospermum pubescens;* but a careful examination of the specimens in the British Museum, from which Lambert's figures were drawn, has led me to doubt the identity of his plant, either with the Sonsonate species or with the *pubescens* of Kunth and De Candolle.

7. In 1823 appeared the sixth volume of Humboldt, Bonpland, and Kunth's *Nova Genera et Species Plantarum*. In this work, the plant figured by Lambert (and called by him *M. peruiferum*, Linn.) is denominated *Myroxylum pubescens*, and the designation *Myroxylum peruiferum*, is retained for the plant sent by Mutis to

Linnæus. These distinctions have been adopted by De Candolle, who, however, has substituted Jacquin's designation of the genus *Myrospermum** for *Myroxylon* or *Myroxylum*†.

8. In 1834, M. Bazire, a French merchant, who lived for many years in Central America, informed M. Guibourt‡ that the so-called balsam of Peru was not the produce of Peru, but of the coast near Sonsonate. He also gave to M. Guibourt two of the fruits (deprived of their membranous wings) of the tree which yields the balsam. These were described by M. Guibourt, who inferred that they were the produce of a species of *Myrospermum* different from any which had been previously described.

9. In February, 1850, M. Guibourt§ published a paper entitled, "*Des Baumes du Pérou et de Tolu*," in which he mentions two species of *Myrospermum* found by Mr. Weddell, in Bolivia, at the foot of one of which he met with a balsamic substance, having the odour of balsam of Tolu, and which M. Guibourt considered to be *dry balsam of Peru*, or the *dry white balsam*.‖

10. Such was the state of uncertainty which existed on this subject when Mr. Skinner kindly undertook to resolve it by procuring for me specimens of the tree and balsams from Central America, and by kindly furnishing me with much valuable written and verbal information. By his aid I have ascertained,

1st. That the tree which yields the so-called balsam of Peru and the white balsam, is a species of *Myrospermum* closely allied to, though probably distinct from, the *Myroxylon balsamiferum* of Pavon, which was figured by Mr. Lambert under the name of *M. peruiferum*, Linn. For the present, therefore, I shall designate the plant which I have received, the "*Myrospermum of Sonsonate*."

2dly. That *black balsam* (*balsam of Peru* of commerce) is obtained by incision into the stem.

3dly. That the *white balsam* is procured from the fruit by pressure.

4thly. That commerce exclusively obtains both of these balsams from the so-called Balsam Coast in Central America.

Description of the Myrospermum of Sonsonate.—The specimens of the *Myrospermum of Sonsonate*, which I have received, consist of branches, leaves, and fruits. The flowers I have not met with.

The *branches* are terete, warty, but otherwise smooth, ash-coloured, or ash-brown.

The *leaves* are alternate, petiolate, and impari-pinnate. The common petioles appear to the naked eye devoid of hairs, but when examined by the microscope are found to be covered with a few short hairs.

---

* Myrospermum, from μύρον *a sweet vegetable juice or oil*, and σπέρμα, *a seed*.

† Myroxylon or Myroxylum, from μύρον, *a sweet vegetable juice or oil, and* ξύλον, *wood*.

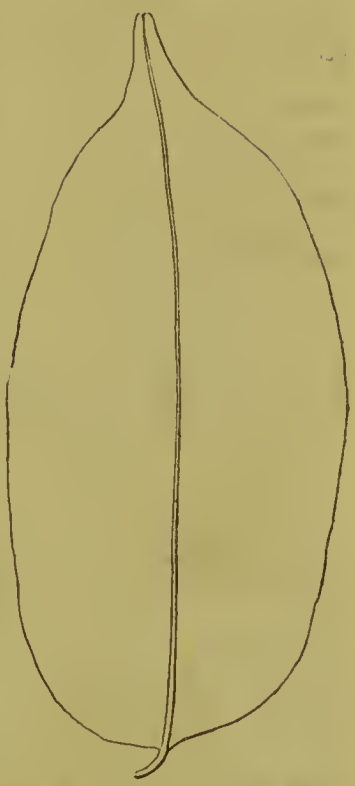
‡ *Journ. de Pharm.*, t. xx., p. 522, 1834.

§ *Journ. de Pharm. et de Chimie*, 3e Sér., t. xvii., p. 87, 1850 ; also, *Hist. Nat. des Drog.*, 4é., ed., t. iii., p. 441, 1850.

‖ I am indebted to M. Guibourt for a specimen of this balsam, as well as for a petiole, and some detached leaflets of the plant from which this balsam was obtained. Furthermore I beg to offer my thanks to M. Guibourt for his kindness in sending the sketches of, and information relating to, the species of *Myrospermum* contained in the Muséum at Paris, of some of which I have availed myself in this paper.

The *leaflets* are from 5 to 11, alternate, with short petioles. Exclusive of foot-stalk, their length varies from about 2 to $3\frac{1}{2}$ inches; and their width, at their widest part, from 1 to $1\frac{1}{2}$ inch (fig. 5). The most usual size is 3 inches in length, and $1\frac{1}{4}$ to $1\frac{4}{10}$ inches wide. Their general shape is oblong or oval-oblong, in some cases ovate. They are rounded or very slightly tapering, not cordiform, at the base. Superiorly they contract abruptly into an emarginate point. To the naked eye the partial petioles and midribs appear devoid of hairs; but when examined by the microscope short lymphatic hairs, having a glossy or resinous appearance are distinctly visible on them; and the partial petioles appear somewhat rough from transverse rugæ. The leaflets are elegantly marked by rounded and linear pellucid spots; the lines being usually parallel with, or in the direction of, the primary veins. To see the spots the leaflet must be held up against a strong light and examined by a magnifier.

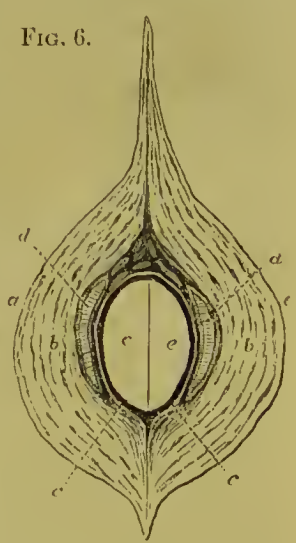
Fig. 5.



Outline of a leaflet of the Myrospermum of Sonsonate. (Natural size.)

The *fruit* is a one-celled, one-seeded, winged, indehiscent pod (called by some a samara, by others a samaroid legume). The fruit-stalk is naked at the base, but is amply winged superiorly. The fruit, including the winged foot-stalk, varies in length from about 2 to 4 inches; the usual length is $3\frac{1}{8}$ or $3\frac{1}{4}$ inches. At the peduncular extremity the fruit (or rather its winged footstalk) is rounded, or very slightly tapering, unequal-sided; at the summit it is enlarged, tumid, and rounded, with a small point (the remains of the style) at the side. The mesocarp is fibrous; but immediately exterior to the endocarp it contains in receptacles a yellow olco-resinous or balsamic juice, which, by age, hardens and resinifies. Ruiz, Kunth, Endlicher, and De Candolle, describe this juice as immediately surrounding the seed, and being between the seed and the lining (endocarp) of the shell: but this is a mistake, it is exterior to the endocarp. The principal part of the balsam resides in two receptacles or vittæ, one placed on either side; but if a transverse section of the fruit be examined by the microscope, other numerous receptacles of the more or less dried balsam are perceived in all parts of the mesocarp. In the two larger receptacles the balsam is usually found in the liquid state; but sometimes the walls of the receptacles are lined with the crystallized balsam (Myroxocarpine). That the

Fig. 6.



Cross section of the fruit and seed. (Magnified.)

a a Epicarp
b b Mesocarp.
c c Endocarp.
d d Large vittæ or lacunæ containing balsam.
e e Cotyledons.

balsam resides in the mesocarp and not in the cavity of the fruit is proved by the cross section (fig. 6), which shows that the paries of the cavity of the fruit is continuous with the two sutures. The seed lies loose and dry in the cell of the periarp; and is covered by a thin, white, membranous coat (testa ?) The cotyledons are yellowish and oily, and have an agreeable odour like that of the tonka-bean or melilot, and a bitter taste somewhat resembling that of the bitter almond. By digesting the seeds in ether a tincture is obtained, which yields on evaporation a very agreeable smelling amber-coloured soft extract, whose odour resembles that of the tonka-bean or melilot.

FIG. 7.
The Myrospermum of Sonsonate. (About one-third the natural size.)

A Leaf-bearing branch.
B Fruit-bearing branch.
C Vertical section of the fruit.
D. Lateral section of the fruit, showing the seed *in situ*.
From specimens in my possession, received from the Balsam Coast by Mr. Skinner.

Some of the fruits which I gave to Mr. Alfred Smee were sown by him in a pot, and placed in his hot-house. Several of them have produced thriving plants. A leaf of one of the plants thus raised consists of 5 alternate leaflets marked with pellucid dots and lines. To the naked eye all parts of the leaves appear quite smooth; but when examined by the microscope the general and partial petioles,

the mid-ribs, and the edges of the leaflets, are seen to be covered with small, reddish, appressed, lymphatic hairs. The lamina of the leaflet is emarginate, but the summit of the mid-rib, crowned by a small bush of hairs, projects, on the dorsal surface, beyond the lamina, and gives the appearance of a minute pointlet or muero. As the leaflets dry this pointlet appears to be shrinking and becoming brown. As the leaf grows it probably falls off.

1. The *Myrospermum of Sonsonate* is probably identical with the *Hoitziloxitl*, or *Indian balsam tree* of Hernandez; and the *balsam tree* mentioned by Don Juarros and Lieut. Baily (fig. 1).

2. From both *Myrospermum frutescens*, (figs. 3 and 8) and *M. pedicellatum* (figs. 4 and 9), the myrospermum of Sonsonate, is distinguished by the size and shape of the leaflets, as well as by the fruit.

Fig. 8.

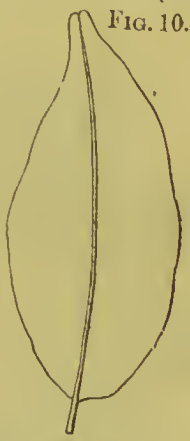
Leaflets of M. frutescens (nat. size).

Fig. 9.

Leaflet of M. pedicellatum (nat. size).

3. The leaflets of *M. peruiferum* (Linn.), (fig. 2 and 10) sent by Mutis to the younger Linnæus, are smaller than those of the plant which I have received from Sonsonate. In shape they are not very essentially different, but are rather more oval-lanceolate than oblong. The general and partial petioles, the mid-ribs, and the edges of the leaflets, are covered by a pubescence. In this respect they agree with the corresponding parts of the young plants of the Sonsonate myrospermum raised by Mr. Smee. The leaflets are also marked by pellucid rounded and linear spots.

Fig. 10.



Leaflet of M. peruiferum, Linn. (Nat. size). From the specimen in the Herbarium of the Linnæan Society.

The leaflets of *M. peruiferum* in Kunth's Herbarium (fig. 11) are rather larger, and more ovate than those in the Linnæan Herbarium; and they are often a little cordate at the base.

Fig. 11.

Leaflet of *M. peruiferum*, Kunth (one-third the natural size).

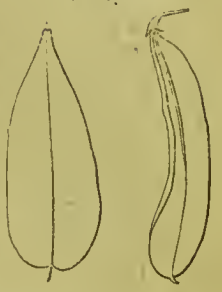
The *Myrospermum* No. 4787, collected by Mr. Weddell in Bolivia, is considered by M. Guibourt to be identical with the *M. peruiferum* of Kunth, though the leaflets are generally smaller.

The *Myrospermum* No. 3613, also collected by Mr. Weddell in Bolivia, and at the foot of which he found a balsamic substance having the odour of balsam of Tolu, and called by M. Guibourt *dry balsam of Peru*, is pro-

bably only a variety of Kunth's *M. peruiferum*. Its leaflets are marked with numerous pellucid dots and lines.

4. The *M. pubescens* of Kunth and De Candolle has the branches and petioles hairy. It differs from *M. peruiferum*, Kunth, in its leaflets being narrower, more oblong, and more rarely cordiform at the base, and by the nerves and petioles being all closely covered with red hair (fig. 12).

Fig. 12.



Leaflet and pod of *M. pubescens*, Kunth. (One-third the natural size.) This and the preceding figure are from sketches sent to me by M. Guibourt.

Kunth and De Candolle regard this species (*M. pubescens*) as identical with the plant figured by Lambert as *Myroxylon peruiferum* of Linnæus. But the branches, petioles, and leaflets of the latter are smooth, and by this character, as well as by the larger size of the fruit, they are distinguished from *Myrospermum pubescens* of Kunth and De Candolle.

The plant which Ruiz (*Quinologia*) has described under the name of *Quinquino*, and which he says is the *Myroxylon peruiferum* of the *Flora Peruviana*, as well as of the younger Linnæus, is probably *M. pubescens* of Kunth; for he describes the common petioles, and the under surface of the leaves, as being hairy.

5. The leaflets of *M. toluiferum* (fig. 13) are never cordate at the base; but, on the contrary, are sometimes tapering. Towards their summit they suddenly contract and terminate by a narrow and elongated point, which scarcely presents any indications of emargination, and indeed sometimes presents not any sign of it.

Fig. 13.

Leaflet of *M. toluiferum*, Kunth, collected at Jaen de Bracamoros (one-third the natural size). From a sketch sent by M. Guibourt.

6. The plant to which undoubtedly the *Myrospermum* of Sonsonate most closely approximates is that which has been figured by Lambert as the *Myroxylon peruiferum* of Linnæus (fig. 14.)

On referring to Pavon's specimens (now in the British Museum), from which Lambert's drawing was made, I find that they are marked in Pavon's own handwriting "*Myroxylon balsamiferum*."

The plant which Ruiz described in his memoir (contained in his *Quinologia*) under the name *Myroxylon peruiferum*, appears to be a distinct plant from Pavon's *M. balsamiferum*. Lambert has, therefore, translated Ruiz's memoir, describing one species of *Myrospermum*, and has added to it a plate representing another species! That the description and plate do not apply to the same species seems evident from the following facts:—

a. Ruiz says that the plant which he describes is called, in the unpublished portion of the *Flora Peruviana* (the joint work of himself and Pavon) *Myroxylon peruiferum:* while the plant from which Lambert's figure is taken is named, in the hand-writing of Pavon (one of the authors of the *Fl. Peruv.*) *M. balsamiferum.*

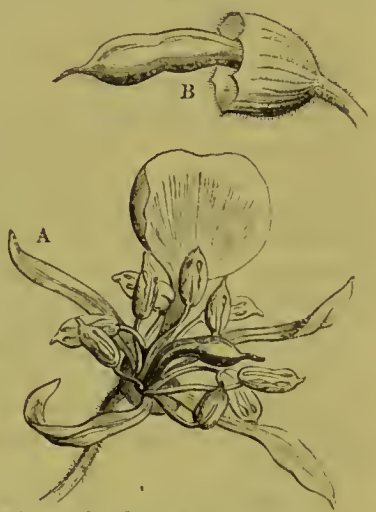
β. Ruiz states that the common petioles and under surface of the leaflets, are hairy; but those of *M. balsamiferum* are quite smooth.

γ. Ruiz describes the leaflets as being ovato-lanceolate; whereas those figured by Lambert are oval-lanceolate.

δ. Ruiz describes the pericarp as being nearly two inches in length; whereas Lambert has figured pericarps, which are from four-and-a-half to nearly six inches long.

The *Myrospermum of Sonsonate* so closely agrees in general with Pavon's *M. balsamiferum*, that I was at first led to believe the two plants to be identical; and I was the more inclined to this opinion from the circumstance that, in one of the communications which I received from Sonsonate, the Myrospermum from that place was called "*Myroxylon balsamiferum*."

Fig. 14.



Myroxylon balsamiferum, Pavon (figured by Lambert as *M. peruiferum*, Linn.)
A. Flower magnified.
B. The curved ovary, surrounded at the base by the calyx.

Lambert's figure appears to have been made up from different specimens in Pavon's collection, and not from any one exclusively. Unfortunately there is reason to suspect that the leaves of at least two species are contained in the collection under the same name, for in some of them the pellucid spots are exclusively round, in others round and linear.

The principal points in which *M. balsamiferum* differs from the *Myrospermum of Sonsonate*, are the following:—

1. *The size and shape of the leaves.*—Many of the leaves of Pavon's specimens, those which agree best with Lambert's figure, are larger than those of the Sonsonate plant.

The shape also is different. While, in the Sonsonate plant the prevailing shape is the oblong, that of Pavon's plant is more oval. Again, the leaves of the Sonsonate plant are more generally rounded at the base and less tapering at the summit than those of Pavon's specimen.

When specimens of the two plants are placed side by side, the prevailing difference observed, is the larger size, and more tapering summits of the *M. balsamiferum*.

2. *The size and shape of the fruit.*—The pods of Pavon's plant are longer than those of the Sonsonate plant. The average length of the latter rarely exceeds three inches or three-and-a-quarter inches, while those of Pavon's plant vary from four to six inches.

In the shape of the fruits there is also a difference. In Pavon's plant the fruit is nearly of equal width throughout, the two margins of the wings being parallel, or nearly so, throughout the greater part of the length of the pod. Thus many of the pods are of the same width (about 1¼-inch) for more than four inches of their length. In the Sonsonate specimens, on the other hand, the margins of the fruit diverge from each other in the direction from the peduncle towards the summit, and in no two parts has the pod the same width.

Central America is the country of the Myrospermum of Sonsonate. It grows on the Balsam Coast (between 13° and 14° N. lat., and 89° and 90° W. long.) in the State of Salvador, where the black and white

balsam are exclusively obtained from it. Hernandez mentions Panuco as one of the places where it grows; and Clavigero * states that it "is common in the provinces of Panuco and Chiapan."

Various medicinal products are obtained from this tree. "By making an incision in the trunk of it, a liquor exudes called the *black balsam*, an admirable remedy for effecting the speedy cure of wounds of every description: from the flowers the *spirit of balsam* is made: the seeds or nut produce the *oil of balsam*, an excellent anodyne; and the capsules yield the *white balsam*. From these simple kinds the *tincture* or *essence of balsam* is extracted: it is generally termed *balsamito*, and was a discovery of Don Jose Eustaquio de Leon, director of the mint in Guatemala, who published a description of the many virtues of this peculiar medicine †."

The only medicinal products of the tree with which I am acquainted are, *black balsam* (commonly called balsam of Peru), *white balsam*, and *balsamito*.

1. THE SONSONATE OR ST. SALVADOR BLACK BALSAM.

This is the *Balsam of Peru* (*Balsamum Peruvianum*, Ph. Lond.) of commerce. At Sonsonate it is termed *Black Balsam (Balsamo negro)*. It is sometimes denominated the *Black* or *Liquid Balsam of Peru*.

Sonsonate or St. Salvador black balsam of commerce (balsam of Peru of the shops) is exclusively the produce of the Balsam Coast, which extends from the Acajutla to the Port Libertad, on the Pacific side of Central America.

It is obtained by the native Indians, who make incisions into the bark of the trees, burn the outside slightly, and insert woollen or cotton rags into the apertures to absorb the juice which exudes. When these are saturated they are removed, and others introduced in their place. The rags are then boiled in water in large jars, by which the balsam is detached, and, rising to the surface, is skimmed off and put into calabashes or bladders for sale. In this state the Indians bring it into Sonsonate. The merchants who purchase let it stand in barrels that the dirty water may separate, and afterwards strain it through a sieve to separate any pieces of rags, or other foreign bodies, which may be present. Usually a little pure water is added, and the balsam is put into jars for exportation at Acajutla. Sometimes it comes direct to Europe, at other times indirectly by Lima, Valparaiso or other parts of the Pacific, or by Belize or Honduras on the Atlantic side of Central America. The average production is about 25,000 lbs. per annum.

Mr. Wazsewiez (a German naturalist and traveller, who is well acquainted with the Balsam Coast) tells me that the natives obtain this balsam from three species of *Myrospermum*, which he calls *M. punctatum*, *M. pubescens*, and *M. myrtifolium*, all of which he says grow on that coast, and are not distinguished by the natives.

---

* *Storio Antica del Messico*, tomo i., p. 63. 1780. (Also the English translation by Cullen, vol. i., p. 32. 1787.)

† *A Statistical and Commercial History of the Kingdom of Guatemala in Spanish America.* By Don Domingo Juarros. Translated by J. Baily, Lieut. R.M. Lond. 1823, p. 261.

2. THE SONSONATE OR ST. SALVADOR WHITE BALSAM.

This substance is called, at Sonsonate, *White Balsam* (*Balsamo blanco*). It is, I suspect, often confounded with the balsam of Tolu, for Mr. Klée, of Guatemala, by whom my sample was sent, says that he sends the white balsam as a sample of balsam of Tolu. Its properties, however, are entirely different to those of balsam of Tolu, which Ruiz calls white balsam.

White balsam is obtained at Sonsonate by pressure, without heat, from the interior of the fruit and seed. Mr. Wazsewiez, who, when in Central America, had assisted in procuring white balsam, described and showed me the method of preparing the fruit for the expression of the balsam. It consists in removing the wings, the epicarp, and the fibrous or woody portion of the mesocarp. All these parts are readily separated by the fingers. The nucleus of the fruit, called at Sonsonate the *pepita* or seed, consisting of the internal portion of the mesocarp, the endocarp, and the seed, is then submitted to pressure.

The expressed product, which is called white balsam, probably consists of two distinct classes of substances, viz., the *oleo-resinous matter* contained in the pericarp, and the *fatty* and other constituents of the seed.

FIG. 15.

Jar, enclosed by matting, containing the white balsam.

White balsam, as I received it, was imported in globular earthen jars, surrounded by a kind of wove or plaited matting, and closed by an earthenware stopper. The jars enclosed in the matting, are about a foot high (to the top of the stopper) and ten-and-a-half inches in diameter, and contain each about twenty pounds of balsam, which has partially concreted or crystallized on the sides of the jar.

When removed from the jar and put into a white glass bottle, it closely resembles in appearance strained American or Bordeaux turpentine. It is semifluid, or a soft solid; and by exposure becomes firmer. It is somewhat granular, apparently from intermixed resinous crystals. By standing, it partially separates into a white and more opaque crystalline resinous deposit, and a superior, more translucent, thinner, and more fluid portion. It is quite devoid of the fragrant cinnamic or vanilla odour of the balsams of Peru and Tolu. Its odour is not disagreeable, and is compounded of the peculiar smell of the balsamic matter of the pericarp, and of the melilot-like odour of the seed. One person who smelled it declared that it resembled the odour of cubebs.

It is only partially soluble in alcohol, but more so in ether. By digesting it in rectified spirit, three products are obtained: 1. A white, tough, soft solid, which remains at the bottom of the vessel. 2. An oleaginous yellow liquid which rests on the preceding; and 3, the spirituous solution which floats on No. 2. By digestion in ether, a portion of the balsam remains undissolved. The ethereal tincture, by evaporation, yields a kind of fatty or resinous product.

3. BALSAMITO.

Esencia Tinturado del Balsamo Virgen; Essence or Tincture of Virgin Balsam.—This is a tincture of the fruit, and is made by digesting the fruit (deprived of its wings) in rum. The sample which Mr. Skinner kindly gave me, is a clear liquid, having the colour of sherry wine, and the odour like that of the melilot (*Melilotus officinalis*) or of the tonka-bean, and a very bitter taste. When mixed with water, it forms a milky liquid.

This preparation, which is in high repute in Central America, was invented by Don José de Leon, Domiciliary Presbyter of the Archbishop of Mexico, and the director and founder of the Royal Mint of Guatemala. Its virtues (real or imaginary) are set forth at great length in a Spanish handbill (now before me) printed in Central America. An abstract of these is given in Lieut. Baily's translation of Juarros's *History of Guatemala*, before referred to. According to these authorities, balsamito is a stimulant, cordial, corroborant, anthelmintic, and diuretic. It is administered in the dose of a drachm in fainting fits, dyspepsia, flatulent colic, the cold stage of fever, hysteria, worms, &c. It is employed also to facilitate labour and the expulsion of the placenta, to check vomiting and diarrhœa, to relieve spasm, &c. In surgery it is extensively used as a vulnerary, as an application to sloughing sores, and to relieve the itching, heat, and pain which remain after the removal of a chigoe (*Pulex penetrans*). Mixed with water it forms a milky fluid, which is used as a face-wash to remove freckles, and as a lotion for ulcers.

Mr. Skinner speaks in the highest terms of the beneficial results which he has himself witnessed from the application of *balsamito* to sloughing and other wounds, and he tells me it is in high repute in Central America as a vulnerary; a portion of this, which he kindly gave to me, I have placed in the hands of my friend and colleague, Mr. Luke, for trial in sloughing wounds. Mr. Luke tells me that he has applied it in one case only, to a sloughing wound. It caused so much pain, that it became necessary to suspend its application. The slough, however, speedily separated.

I subjoin two extracts, one from a private letter to Mr. Skinner from his partner, Mr. Klée—the other from Lieut. Baily's work on *Central America*, just published. They are in part my authorities for some of the preceding statements.

APPENDIX.

1. *Extract of a letter to G. U. Skinner, Esq., from Charles Rudolph Klée, Esq., Prussian Consul-General for Central America.*

"The tree which produces the *Balsamo negro*, or *Balsamo de Peru*, in this country, grows only in a small district in the state of San Salvador, near the town of Sonsonate, called "the Balsam Coast;" and although a very hot climate it is a hilly country, but a very rich soil. It is only populated by pure Indians, who possess the secret of extracting the said balsamo de Peru, which they bring for sale to Sonsonate, put in gourds or bladders. In this way they used to ship it formerly, but the Indians bring it often mixed with rags and water; and now the merchants in Sonsonate let it stand some time in barrels and clean it, and then pack it in jars, in which package it is generally shipped now. Any other sort

of oily matter does not mix with the balsam, and the dirty water gets soon to the bottom, after which it is strained; although it appears very thick it passes through a very thin sieve. Generally a little pure water is put into the jars: they say it prevents fermentation. From all the accounts that I could learn from the people in Sonsonate, and from the very Indians who sold the balsam, and which I believe to be true, it appears, that in certain seasons, they make incisions in the bark of the tree, burn the outside slightly, and then bind woollen or cotton rags round it, in which the balsam is caught up; the rags are afterwards boiled in large jars with water, and the rags fall to the ground. There is *no* other place on the whole Pacific side where this balsam is made but on this Balsam Coast. All the balsamo negro which comes to the European markets, by way of Lima, Guayaquil, Valparaiso and Belize, Honduras, or Stó. Tomas de Guatemala, is the produce of our balsam coast. The whole production of it does not amount to more than 20,000 lbs. or 30,000 lbs. per year—the average may be 25,000 lbs. The merchants in Lima and Valparaiso buy it with much pleasure, and pay good prices to the Sonsonate merchants.

"The Canonigo Dhiguero, when he was proprietor of Ispauguasate, planted the balsam tree there, and I found about fifty fine large trees. The tree itself is a very fine tall and handsome one, with a straight, round, and high stem; the bark smooth, ashy coloured, and not very thick. The branches extend at the top, and the leaf is of a dark glossy green, rather a little curled. On a tree which was near the Campana, I tried the experiment to get the balsam out, but did not succeed; and one of the mozos told me that it was not the right time. The tree grows as high as any of your oak-trees, and as thick.

In April, 1846, I purchased two jars of *Balsamo blanco* of a gentleman from Sonsonate, as a sample of *Balsamo de Tolu;* these I send you as well as the kernels of which it is made. By the mode they manufacture it, it can never be made an article of trade; and, unless you send us an apparatus and instruction how to extract it, which I think might be done in the way that heavy oils are extracted, such as oil of cloves, &c., provided it is worth while, no use can be made of it.

"The *Esencia tinturada del Balsamo Virgen*, is what we call here *Balsamito.* Finding by experience, that it would be a fine drug, curing old wounds, perfuming, washing, &c., &c., I got from Don José Soto the way to prepare it, and the sample which I remit to you by the Honduras and Pacific side is pretty large, and of fine quality.*

"As I have told you already, this balsamito is made by infusing the nut of the balsam tree, macerating the shell and kernel in brandy† of thirty degrees. Its inventor was José de Leon, Esq., as you will see by the printed paper enclosed. However, the shell of the nut, which is like that of an almond, contains in its concavities a most aromatic oil, and more so than that of the kernel itself. Brandy can never extract all this oil. Perhaps Dr. Pereira would be kind enough to put you in the way to learn the mode how to extract the balsam, after he has seen the nut, &c.

"In answer to Dr. Pereira's questions:

"1st, I remit you a box with ten bottles of balsamo negro, or balsamo de Peru, made at the balsam coast, and remitted to me by Mr. Victor Lenouvel, of Sonsonate, and which is the produce of the bark of the balsam tree, called by M. de Wazsewiez, *Myroxylon peruiferum*, as he told me. He has seen it at Ispanguasate, and at the Balsam Coast. This balsam is extracted as first described.

---

* It is now in the West India Docks.—*J. P.*

† The liquid here and in other places called "brandy," is in fact, "rum," being obtained by fermentation from sugar.—*J. P.*

"By looking at it you will soon find that it is the identical balsam of commerce, of which we have remitted some large lots in former times, and of which you will get a considerable lot next year.

"No. 1. A piece of stem and bark, will be remitted shortly.

"No. 2. The way to extract the balsam I have mentioned, but all I may further learn about it will be reported.

"Nos. 3 and 4. Branches with fruit and flowers will be remitted.

"I shall order Saravia to send a few Arobas of seed, &c. &c. from Sonsonate, and another similar parcel I shall send José M. Tun for to Ispanguasate. It strikes me that the tree is just now in fruit. The small parcel of pepitas which I remit now is the same which I bought in 1846. It is the almond without the shell, of which the white balsam is made. It is a scarce article of trade. I had never seen it before, nor does any of it appear in trade, here or in Sonsonate.

"The balsam tree grows on sundry other places on the Pacific side of Central America; but no notice is taken of it, nor is any balsam produced from it there. Near Chiquimulilla and on the Coast of Suchiltepeques there are trees of it.

"The first essay of making balsamito you will find in the box with the balsamo: one bottle with balsamito distilled in *bain marie;* one bottle with balsamito made in the common way by infusion; one bag with the almond goes alone."

2. *Extract from Mr. Baily's Work, entitled "Central America; describing each of the States of Guatemala, Honduras, Salvador, Nicaragua, and Costa Rica; their Natural Features, Products, Population, and reasonable capacity for Colonization."* 8vo, 1850. Saunders, 6, Charing Cross.

"That part of the coast extending from Acajutla to Libertad, is emphatically termed the "Balsam Coast," because there only is collected the article known in commerce as the Balsam of Peru; the particular district is intermediate to the two ports, and is not large, as it does not reach either of them within three or four leagues. Lying to the seaward of a low lateral ridge of mountains, the whole tract, excepting a few parts on the borders of the ocean, is so much broken up by spurs and branches thrown off from the main eminence, and so thickly covered by forest as to be nearly impassable to a traveller on horseback; from this cause, it is so rarely visited, that very few residents, either of Sonsonate or Salvador, have ever entered it. Within this space are situated some five or six villages, inhabited solely by Indians, who are so jealous of their possessions, that they will not suffer any of a different race to live among them. They cultivate so little ground for maize, frixoles, plantains, and other necessaries for subsistence, besides a very small quantity of cocoa, that they are not unfrequently forced to purchase these articles from adjoining parts. They have their own municipalities and chief men, governing themselves pretty much as they please, being, in fact, almost independent of every other authority. In some of the villages there is a church, but in no one a resident curate, who, when his ministry is deemed indispensable on festivals or other occasions, is attentively conveyed by them to and from Guayacoma or Ateas, to which curacies they nominally are dependent. Strictly speaking, they hold no other intercourse with other towns than what is necessary for carrying on their peculiar traffic.

"They support themselves by the produce of the balsam trees and cutting cedar timber, of which they furnish large quantities in plank and scantling to Sonsonate and San Salvador for building purposes and carpentering, with occasionally some pieces of more valuable wood, fit for cabinet work. Their chief wealth is the balsam, of which they take to market from fifteen to twenty thousand lbs. weight annually, yielding from four thousand seven hundred to six thousand three hundred

dollars. It is sold in small portions at a time in the before-mentioned towns to persons who purchase for exportation. The trees yielding this commodity are very numerous on this privileged spot, and apparently limited to it, for on other parts of the coast, apparently identical in soil and climate, rarely an individual of the same species is here and there met with.

"The balsam is extracted by making an incision in the tree, whence it gradually exudes and is absorbed by pieces of cotton rags, inserted for the purpose. These, when thoroughly saturated, are replaced by others, which, as they are removed, are thrown into boiling water. The heat detaches it from the cotton, and the valuable liquor being of less gravity than the water, floats on the top, is skimmed off, and put in calabashes for sale. The wood of the tree is of close grain, handsomely veined, nearly of a mahogany colour, but redder; it retains for a long time an agreeable fragrant odour, and takes a fine polish. It would be excellent for cabinet makers, but is seldom to be obtained, as the trees are never felled, until by age or accidental decay all their precious sap is exhausted. This balsam was long erroneously supposed to be a production of Southern America, for, in the early period of Spanish dominion, and by the commercial regulations then existing relative to the fruits of this coast, it was usually sent by the merchants here to Callao, and being then transmitted to Spain, it there received the name of Balsam of Peru, being deemed indigenous to that region. The real place of its origin was known only to a few mercantile men."—(Pp. 93, 94.)

ON MYROXOCARPINE:

A NEW CRYSTALLINE SUBSTANCE FROM WHITE BALSAM.

BY JOHN STENHOUSE, LL.D., F.R.S.

A few months ago I received a quantity of a fragrant semifluid balsam from my friend Dr. Pereira, which had been sent to him from Guatemala, under the name of *white balsam*.

This balsam is said to be obtained from the fruits of the same tree which yields the ordinary balsam of Peru.

The white balsam is quite neutral to test paper, and has a peculiar agreeable smell, pretty closely resembling that of melilot. On digesting the balsam in spirit of wine of ordinary strength, a considerable portion of it readily dissolved, and on the clear liquid remaining at rest for twelve hours, a quantity of large white crystals were gradually deposited. These crystals, which retained a good deal of adhering resinous matter, were obtained perfectly pure when they had been digested with a little animal charcoal, and repeatedly crystallized out of hot spirits. When pure the crystals have no smell, and form broad thin prisms rather more than an inch in length. They are colourless, and possess considerable lustre, approaching that of nitrate of silver. They are hard and brittle; insoluble in both hot and cold water, but readily dissolve in hot alcohol and ether. They are also soluble to some extent in cold alcohol and ether. When chewed they have no taste. Their solution is quite neutral to test paper. I have given this crystalline substance the name of *myroxocarpine*, in the belief that it is derived from the fruits of the Myrospermum as previously mentioned. It was subjected to analysis with oxide of copper in the usual way.

I. 0.2907 substance dried *in vacuo* gave 0.821 carbonic acid and 0.247 H O
II. 0.215 ditto gave 0.6085 carbonic acid and 0.185 water.

Calculated numbers :			I.	II.
48 C ...	3600	... 77.63	... 77.02	... 77.18
35 H ...	437.5	... 9.43	... 9.46	... 9.55
6 O ...	600.0	... 12.94	... 13.52	... 13.27
	4637.5	100.00	100.00	100.00

The empirical formula for myroxocarpine is therefore

48 C 35 H 6 O.

Myroxocarpine, when dried *in vacuo*, and then heated to 100° C., loses no weight. It melts at 115° C., and forms a transparent glass, which does not crystallize on cooling. It re-crystallizes, however, when it has been dissolved in hot spirit of wine. When myroxocarpine is heated considerably above its melting point, a very small portion of it sublimes, but by far the greater part of it undergoes decomposition, being changed into an uncrystallizable resin, with the formation of much acetic acid.

Myroxocarpine is characterized by extreme chemical indifference. It displays no affinity for either acids or alkalies, none of which at all increase its solubility. A quantity of it remained unchanged after having been boiled for several hours with a strong solution of potash. It is also but difficultly attacked by acids. Strong nitric acid, when assisted by heat, slowly converted it into oxalic acid and an uncrystallizable resin, but without the formation of carbazotic, or any similar acid. Chlorine also acts upon it very slowly. A current of chlorine gas sent for several days through a quantity of myroxocarpine in a finely divided state, and diffused through water, slowly converted it into an uncrystallizable resin, which contained variable quantities of chlorine. The chlorine, however, was retained by a very feeble affinity, for when the resin, which had been washed with water till it was quite natural, was dissolved in hot spirits, its solution, on standing for a short time, became strongly acid. Bromine produced a very similar result.

I regard myroxocarpine, therefore, as a very indifferent crystallizable resin, which in some respects, especially in the readiness with which it crystallizes, closely resembles santonine, but exhibiting much feebler chemical affinities than even that compound. The white balsam is very rich in myroxocarpine, a pound of the balsam yielding about one ounce of the principle.

Through the kindness of Professor W. H. Miller, of Cambridge, to whom I have been often indebted for similar favours, I am enabled to subjoin the accompanying figure and measurements of the angles of myroxocarpine.

Prismatic. Symbols of the simple forms :
c 001, *r* 011, *s* 012, *u* 101, *v* 201, *m* 110.
Angles between normals to the faces :

m c	90°	0
m m'	77	48
r c	52	56
s c	69	19
u c	46	53
v c	64	55

No cleavage observable.